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Claims

1. A device for the formation of gradient layers on substrates in a vacuum chamber by means of a particle flow formed from at least one plasma source or by vaporization, which is directed upon the substrate surface to be coated,
wherein a mask having discretely located perforations is disposed between a particle source and a substrate,
characterized in that
said mask (1) of constant thickness can be moved oscillatorily by means of a drive along at least one axis with respect to said substrate (3) in a plane, and the ratio of free cross-sections of said perforations (2) being discretely present in said mask (1), and the intermediate web surfaces of said mask (1) per area unit is varied over the total surface or on areas of said mask (1),
and / or the distance between the surface of said substrate (3) and said mask (1) is different in size over the total surface of surface areas.

2. A device according to claim 1,
characterized in that said perforations (2) of said mask (1) each have identical free cross-sections and cross-sectional geometries.

3. A device according to claim 1 or claim 2,
characterized in that said free cross-sections of said perforations (2) are formed in a circular, hexagonal, octagonal or elliptical form.

4. A device according to at least any one of the preceding claims, characterized in that the ratio of said free cross-sections of said perforations (2) and said intermediate web surfaces per unit of area are continuously varied along at least one axis.

5. A device according to at least any one of the preceding claims, characterized in that said perforations are formed in a column and line arrangement within said mask (1).

6. A device according to claim 5, characterized in that said perforations are located offset to each other in the adjacent columns or lines.

7. A device according to at least any one of the preceding claims, characterized in that the distances of said perforations (2) are varied along at least one axis.

8. A device according to at least any one of the preceding claims, characterized in that the surface of said substrate (3) is aligned at an angle obliquely inclined with respect to said mask (1) and / or is curved.

9. A device according to at least any one of the preceding claims, characterized in that with a curved substrate surface the ratio of the free cross-sections of said perforations (2) and said intermediate web surface per unit of area takes into consideration the respective distance of said substrate surface and / or the inclination of said substrate surface and said mask (1).

10. A device according to at least any one of the preceding claims, characterized in that said mask (1) is aligned

at an angle obliquely inclined with respect to the surface of said substrate (3) and / or is curved.

11. A device according to at least any one of the preceding claims, characterized in that the direction of motion of said oscillatory motion is aligned in parallel to the respective lines and / or columns of perforations (2).

12. A device according to at least any one of the preceding claims, characterized in that the plasma source is a magnetron sputtering source.

13. A device according to at least any one of the preceding claims, characterized in that said substrate (3) and said mask (1) are movable together relative with respect to said plasma source and / or said target (4).

14. A device according to claim 13, characterized in that said substrate (3) and said mask (1) rotate about a common axis of rotation.

15. A device according to at least any one of the preceding claims, characterized in that said drive for said oscillatory relative motion between said substrate (3) and said mask (1) is at least a piezo actuator.

16. A method for the formation of gradient layers on substrates in a vacuum chamber by means of which a particle current formed from a plasma source or by means of evaporation of a target material will be directed through a mask located between said particle source and said substrate, in which perforations are formed, characterized in that

the local thickness of said formed layer on the substrate surface is defined by predetermined locally adapted ratios of free cross-sections and said intermediate web surfaces per unit of area and / or by holding of particular distances between the surface of said substrate (3) and said mask (1), and said mask (1) having a constant thickness is moved oscillatorily along at least one axis relative to said substrate (3) in a plane.

17. A method according to claim 16, characterized in that with an oscillatory motion the path to be travelled between inversion points or during a circular path motion the diameter corresponds to the mean distance of the centre or centre of gravity of said perforations (2).

18. A method according to claim 16 or claim 17, characterized in that said relative motion or said circular path motion is performed in the plane of the mask.

19. A method according to at least any one of claims 16 to 18, characterized in that a gradient multilayer system having at least two different layer materials is formed on the surface of said substrate (3).

20. A method according to at least any one of claims 16 to 19, characterized in that one or several gradient layer(s) formed one above another will be formed on predetermined areas of the surface of said substrate (3).

21. A method according to at least any one of claims 16 to 20, characterized in that the layer(s) is (are) formed by means of magnetron sputtering.

22. A method according to at least any one of claims 16 to 21, characterized in that said substrate (3) and said mask (1) are moved together with respect to said particle source (4).

23. Use of a device according to any one of claims 1 to 15 for the fabrication of X-ray optics elements.